

The Journal of the American Association of Zoo Keepers, Inc.

Animal Keepers' Forum



September 2017, Volume 44, No. 9



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The American Association of Zoo Keepers, Inc. exists to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

ABOUT THE COVER

This month's cover photo comes to us from Karen Caster, Primate Keeper at Little Rock Zoo. The photo features "Streep" a blue-eyed black lemur (*Eulemur flavifrons*). Streep is a "Golden Girl" in more ways than one. Not only is she golden in color, but she is in her golden years. On St. Paddy's Day she turned 22-years-old. Life expectancy is 20 - 25 years for blue-eyed black lemurs. Blue-eyed black lemurs in North America tend to be named after celebrities with blue eyes. Our girl is named after award-winning actress Meryl Streep. Born at Duke Lemur Center, Streep has also lived at the Racine Zoo and Indianapolis Zoo, respectively, before landing at the Little Rock Zoo in 2012. Making this Golden Girl even more special is the fact that she is a cancer survivor. In 2009 she was diagnosed with hepatocellular carcinoma (a common form of liver cancer). She had the mass and part of her liver removed. Today she is still cancer free!

These lemurs are one of only a few species of primates (including humans) that consistently have blue eyes. Exhibiting sexual dichromatism, the males are the only ones that are black. The females are a reddish brown to gray. Blue-eyed black lemurs are considered critically endangered according to the IUCN Red List of Threatened Species. They are considered one of the most endangered primates in the world. Habitat destruction and hunting for food are their biggest threats.

Articles sent to **Animal Keepers' Forum** will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for **AKF**. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the Editor. The Editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or e-mail contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone (330) 483-1104; FAX (330) 483-1444; e-mail is shane.good@aazk.org. If you have questions about submission guidelines, please contact the Editor. Submission guidelines are also found at: aazk.org/akf-submission-guidelines/.

Deadline for each regular issue is the 3rd of the preceding month. Dedicated issues may have separate deadline dates and will be noted by the Editor.

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ANIMAL KEEPERS' FORUM

TO CONTACT THE AKF EDITOR:

Shane Good, AKF Editor
P.O. Box 535, Valley City, OH 44280
330-483-1104
Shane.Good@aazk.org

AAZK Administrative Office

American Association of Zoo Keepers
8476 E. Speedway Blvd. Suite 204
Tucson, AZ 85710-1728
520-298-9688 (Phone/Fax)

CHIEF EXECUTIVE/FINANCIAL OFFICER: Ed Hansen
E-mail: Ed.Hansen@aazk.org

ANIMAL KEEPERS' FORUM - EDITOR

Shane Good, Shane.Good@aazk.org

GRAPHIC DESIGNER

Elizabeth Thibodeaux, Elizabeth.Thibodeaux@aazk.org

ENRICHMENT OPTIONS COLUMN COORDINATORS

Julie Hartell-DeNardo, Heather Dunn

Stephanie Miner, Beth Stark-Posta, Beth Ament-Briggs

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Kudos to the National Capital Chapter and the Smithsonian's National Zoo for a first-rate National American Association of Zoo Keepers (AAZK) Conference! From the Ice Breaker, to the new evening Awards Ceremony and finally the Banquet, I want to thank them for all their hard work planning the conference and providing the delegates with a historic experience in Washington D.C. I hope you were able to do some sightseeing and learn more about our nation's history.

Whether you attended the paper or poster sessions, topical workshops or a professional certificate workshop (Keeper Excellence in Research, Nutrition, Reptile and Amphibian Husbandry), the information they offered is a valuable resource and I encourage you to share it with your co-workers and managers. All the events, including an outstanding Zoo Day enabled delegates to network and be appreciated for their hard work and dedication to the zoo and aquarium field and as an AAZK Member. If you were not able to attend, speak with your manager about attending next year's conference hosted by the Rocky Mountain Chapter and the Denver Zoo, October 4 - 8, 2018.

Going the extra mile is hard work and I appreciate all you do every day! Sometimes I feel we are like the U.S. Marines in that we do more before 9 am than most people do in a day. Going the extra mile includes all the support you give to AAZK's conservation programs, Bowling for Rhinos (BFR) and Trees for You and Me (TFYM). I want to give a year-end reminder for donating to TFYM by November 1st on the AAZK website or by applying for the grant. Remember, this is a forest-based carbon offset grant with funds generated by AAZK Chapters hosting TFYM fundraising events. It furthers AAZK's and PBI's quest to fight climate change by asking for grant applicants that will use it for reforestation and habitat revitalization. Please support TFYM by holding a fundraising event and/or letting a local organization know about the grant. You can find all the information at <https://www.aazk.org/committee/trees-for-you-and-me/>.

I really appreciate all the volunteers who support AAZK. I understand the countless hours spent by members, as I have done so as well. My term on the AAZK Board ended at the conclusion of the National Conference celebrating AAZK's 50th Anniversary. What a milestone to be a part of! I am grateful for the opportunity being a Board Member has given me to develop new skills and more importantly, to serve the Association's membership. Thank you to Ed Hansen, Shane Good, Mary Ann Cisneros, Bethany Bingham, Bill Steele and Denny Charlton and all the past AAZK Board Members I have worked with for your friendship and support. I have tremendously enjoyed serving with each of you!

Please welcome Bethany Bingham as your new AAZK President, who will work hard to improve the Association for you.

Thank you for your membership,

Penny Jolly



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Post upcoming events here!
e-mail shane.good@aazk.org

October 1-4, 2017

Orangutan SSP Husbandry Workshop

New Orleans, Louisiana
Hosted by Audubon Zoo
For more information go to:
<http://audubonnatureinstitute.org/conservation-programs/1309-orangutan-ssp-workshop>

October 2-6, 2017

From Good Care to Great Welfare: A Workshop Designed for Animal Care Professionals

Detroit, MI
Hosted by Detroit Zoo
For more information go to:
www.czaw.org/

October 2-6, 2017

38th Annual Elephant Managers Association Conference 2017

Columbus, OH
Hosted by Columbus Zoo
For more information go to:
elephantmanagers.com/

October 26-28, 2017

Regional Conference of the Association of Zoo and Aquarium Docents and Volunteers

Greensboro, NC
Hosted by Greensboro Science Center. For more information go to:
greensboroscience.org/get-involved/azadv-regional-conference/

November 4-8, 2017

ZAA 12th Annual Conference

San Antonio, TX
Hosted by San Antonio Zoo
For more information go to:
zaa.org/conference/annual-conference

November 8-9, 2017

Fruit Bat Husbandry Course

Gainesville, FL
Hosted by Lube Bat Conservancy
For more information go to:
lube.org/events/ husbandrycourse/

March 24-29, 2018

AZA Mid-Year Meeting

Jacksonville, FL
Hosted by Jacksonville Zoo and Gardens
For more information go to:
aza.org/conferences-meetings#mym

April 10 or 11, 2018

(*same workshop held each day) Ape Cardio Health Workshop

Waco, TX
Hosted by Cameron Park Zoo
For more information contact:
orangutan@wacotx.gov

September 23-27, 2018

AZA Annual Conference

Seattle, WA
Hosted by Seattle Aquarium and Woodland Park Zoo
For more information go to:
aza.org/conferences-meetings#mym



October 4-8, 2018

AAZK National Conference Denver, CO

*Hosted by the Rocky Mountain
AAZK Chapter and Denver Zoo*

rmaazk.org/2018-national-aazk-conference/

October 14-18, 2018

International Congress on Zookeeping

Buenos Aires, Argentina
Hosted by Fundacion Temaikken and the International Congress of Zookeepers
For more information go to:
iczoo.org/congress

AAZK Online

The AAZK Online portal is now functioning on the web site.

Individual members of AAZK may now enter AAZK Online from the AAZK Website (if they prefer) to access their account.

Individual members new to AAZK Online may access AAZK Online Resources and create their account to view AAZK resource materials.

Also - AAZK Individual members are presented with the opportunity to sign up with San Diego Zoo Global Academy at a 10% discount with upgraded access to the Academy - AAZK Individual Members have access to the full course catalog for the Academy.

<https://www.aazk.org/about-us/aazk-online/>



Travel Opportunities on AAZK.org

Member Institutions or Individual Members now have the opportunity to view opportunities for international travel that are designed for the Animal Care Professional. These postings are not designed internships but a chance to travel with primarily fellow professionals to international destinations. Travel may have very brief volunteer opportunities or limited opportunities for species surveys or research. The contact person will provide all additional travel information, costs and travel requirements.

Member Institutions or Individual Members may also list trips that are being led by zoo professionals, primarily designed for animal keepers, again with the intention that these trips are not your "classic" commercial trip, but an opportunity geared towards animal keepers and zoo-associated individuals.

AAZK reserves the right to approve or edit all Travel Opportunities for posting based upon content.

Current Travel Opportunities are located on the AAZK Home Page under About and under the Travel Opportunities Tab or follow the LINK <https://www.aazk.org/about-us/travel-opportunities/>.

Member Institutions or individual members who wish to post travel opportunities may do so by contacting Ed Hansen, AAZK CEO, at Ed.Hansen@aazk.org.

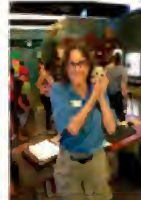
AAZK's Golden Trivia!

Last Month's Answer

There are 108 chapters of AAZK, which chapter was the 100th?

The 100th chapter of AAZK was the Akron Zoo Chapter!

Thank you for participating in this year's Golden Trivia at home and at the at the conference! And congratulations to this year's Golden Keeper, Sara Riger.



The Price of 'White Gold': The Long-term Cost Associated with Poaching African Elephants (*Loxodonta africana*)

Jackie O'Donnell
Miami University Graduate Student (GFP)



Abstract

There are several threats endangering the persistence of African elephants, *Loxodonta africana*, including habitat loss, fragmentation, and human-elephant conflict, but the greatest threat to this keystone species is poaching. With the influx of importation of wild African elephants into accredited zoological institutions it is essential to educate zoo professionals as well as the visitors about the conservation challenges they face. As the Asian middle class expands, there is an increase in demand for 'white gold' due to the social value Chinese place on ivory. Many more species, including both predators and grazers alike, will be affected if conservation efforts are not focused on elephants' survival. Since the implementation of African elephants under Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), poaching has decreased. Now, over two decades later, the long-term effects, caused by heavy poaching before the ban, are becoming apparent. Alterations in age structure, social behavior, reproductive patterns, and their sex ratio have recently become visible. Poaching focuses on the largest, mature individuals due to their relative

tusk size, which mainly indicates breeding bulls and knowledgeable matriarchs. Although there is already legislation protecting the elephants from poaching, further actions need to be taken to ensure the existence of African elephants starting with decreasing the demand for ivory.

Keywords: African Elephants, Poaching, Ivory, Tusks, Human-Animal Conflicts, Long-Term Effects, Keystone Species, CITES

Introduction

With an influx of importation of wild African elephants, *Loxodonta africana*, within today's zoological institutions, the relevant ecological and conservation issues associated with their continued existence is becoming more important. All accredited zoos and aquariums (referred to as zoos) not only bring nature back to more than half of the world's population that lives within urban environments (Miller, 2005), but they also help promote conservation and education within today's society (Fraser and Sickler, 2009). With ten percent of the global population visiting a zoo every year, these facilities have the ability to make a large impact and help inspire and implement behavior

changes towards a more conservation-minded lifestyle (Miller, 2005). By addressing the long-term effects associated with poaching and understanding the driving forces behind it, zoos can help decrease the demand for ivory across the global market.

Elephants' Ecological Role

African elephants play an essential role as a keystone species in African ecosystems and their continued reduction in population is a severe threat to biodiversity. Within one decade (1979 - 1987) the population had dwindled from 1.3 million individuals to less than 600,000 due to poaching (Gobush et al., 2008). These exceptionally intelligent animals have a very complex social structure (Gobush et al., 2008) and the demand for ivory, also known as 'white gold,' has huge implications on their survival due to their slow reproductive rate and long life expectancy (Mondol et al., 2014). By increasing knowledge about poaching and its long-term effects on the population, management practices can evolve to combat this rising threat to the species' perseverance.

Numerous species rely on elephants to maintain an ecosystem balance due to their



large home ranges and massive appetites. They have the ability to influence their habitats by seed dispersal, terrain alteration, and foraging preferences, making elephants one example of ecosystem modifiers. Adult elephants consume an average of 136 kg (300 pounds) of food per day (Cohn, 1990). This substantial size allows for numerous fruit and plant species to spread their seeds through an individual's fecal matter (Cohn, 1990). By ingesting a plant in one location and defecating the seeds in another, an individual shrub has the ability to replicate in several locations. This capability is necessary to maintain enough resources for the various grazers that reside in Africa.

Consumption is not the only way African elephants help to maintain a delicate balance, but their constant foraging behaviors allow for open spaces to be created. When an animal that weighs several thousand pounds treks through the savanna, they uproot small trees and underbrush while stripping leaves from branches (Amsel, 2005; Cohn, 1990). This increases the grasslands and affects the population of several grazing species, such as gazelle, zebras, and wildebeests (Amsel, 2005). In turn, predators that rely on these

prey species are also influenced by elephant populations (Amsel, 2005). Cheetahs, wild dogs, lions and vultures need grazers to ensure their livelihood and, therefore, further rely on the survival of African elephants. By severely altering the habitat surrounding them, there is no denying the African elephant's essential role in the ecosystem and their presence as a keystone species (Amsel, 2005; Cohn, 1990; Delsink et al., 2013).

Allowing conservation efforts to be focused on elephant survival proves to be beneficial for numerous species beyond the one being implicated (Delsink et al., 2013). By addressing the major threats to this species' endurance, such as poaching, the fragile ecosystem of Africa's savanna has the potential to tolerate human modification.

Poaching Problems for Elephants

There are several threats jeopardizing the future of the largest land mammal including habitat loss, fragmentation, and human-elephant conflict, but the greatest hazard is the illegal hunting and killing of African elephants (Gao and Clark, 2014; Muth and Bowe, 1998). In 2012 alone, over 25,000 individuals were

slaughtered for their 'white gold' due to poaching (The History of the Ivory Trade, n.d.). With limited employment, the financial benefit of poaching just one elephant can offer an African citizen more income than they would make in a year (Vandergrift, 2013). This toxic combination of limited employment opportunity and an increase in demand for ivory may have massive implications on the species' survival.

Poaching was first introduced in the early 1900's as a sport for wealthy Westerners (The History of the Ivory Trade, n.d.), but has remained prevalent due to the status symbol ivory portrays in Asian markets (Anderson and Jooste, 2014). With China's recent economic success, the middle class has expanded creating many more potential buyers fueling the demand for ivory (Gao and Clark, 2014). Their society places several values on ivory including cultural and aesthetic values as historical artwork, economic value as investment potential that can withstand depreciation, and most importantly social value due to the history that only the privileged could afford ivory (Gao and Clark, 2014). This intrinsic value is the main cause for the rise in demand (Anderson and Jooste, 2014) and should be the

focus to counteract the thousands of elephants poached annually in Africa.

The illegal trafficking of ivory has tripled between 1998 and 2011 indicating a rise in poaching and the increasing threat to elephants (Gao and Clark, 2014). In the past, an average villager hopes to make around \$20 USD a month, but the demand for ivory offered \$120 USD for one set of tusks (Cohn, 1990) and the price has continued to increase in recent years. Since the rise in value, from \$200 USD per kilogram in 2003 to \$3,000 USD in 2013 (Anderson and Jooste, 2014), is primarily due to the expanding numbers of the Asian middle class, a shift from preventing poaching to decreasing the desire for poached goods, such as tusks, is necessary for their survival. One way to initiate a transition is through legislative reform.

The fundamental policy protecting African elephants within a global market is through the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). They became protected under Appendix I in 1989 which enforces strict regulations on exportation of tusks, as well as any other products produced from elephants (Gao and Clark, 2014, Vandergrift, 2013). The United States and China are two of over 100 countries that have approved these policies providing necessary limitation to help counteract poaching, but ivory continues to be exported to these countries. In the early 1990's the value of ivory declined tremendously due to CITES (The Poaching Problem, 1997; Vandergrift, 2013), but the rising demand from more customers could push African elephant populations closer to extinction, therefore further legislative action is required.

Purpose

The increased trend in poaching has

substantially affected African elephants by decreasing the amount of individuals within the population, as well as, their habitat range (Mondol et al., 2014). This notion has continued effects that are just now becoming apparent due to the species' long generation time (Gobush et al., 2008), but their impact on biodiversity as a keystone species cannot be overlooked. This paper focuses on the long-term effects illegal poaching still has on African elephants twenty-five years after CITES was implemented and what steps need to be taken before further implications are felt by the species protected underneath the elephants' umbrella. Unless corrective measures are hastily taken, the extinction of the African elephant is a near certainty (Anderson and Jooste, 2014).

Discussion

Most areas in Africa have felt the trauma associated with the removal of mature elephants from the population. It is hard to distinguish the effects between poaching, culling, and legal hunting due to the unanimous result of individuals being removed (Gobush et al., 2008), but the extreme magnitude of poaching is unmatched by other scenarios and, therefore, is the main cause associated with long-term effects that are becoming apparent within the population of African elephants. In many National Parks, such as Mikumi in Tanzania, elephant populations dropped to half their original numbers due to poaching before the 1989 ivory ban (Gobush et al., 2008). Once the full effect of CITES had taken place, Mikumi National Park now loses just a few individuals every year to poaching indicating that the disruption seen in today's population are long-term effects caused by the poaching frenzy prior to 1989.

Poaching trends target the largest individuals, particularly large bull elephants, due to their

corresponding tusk size (Mondol et al., 2014). As poaching persists, the availability of males decreases and the focus turns to the second largest tusk producer, the female matriarchs. There are several consequences related to targeting the mature population including, but not limited to; alterations in age structure, social behavior, reproductive patterns, and an unbiased sex ratio. All of these implications are entwined together to form an uncertain future for African elephants.

Age Structure

The average life span for African elephants is between 40-60 years-old, but even in the 1990's it was almost impossible to encounter an individual over the age of 30 in several parts of Africa (Cohn, 1990). This is worrisome due to three-fourths of family units should be led by a matriarch older than 30 (Owens and Owens, 2009), as well as the fact that males don't normally begin breeding before 30 (Cohn, 1990). Taking away the mature population has caused an unbalance in solitary individuals, a lack of competition among males, and severe social implications due to herds without matriarchs.

The largest amount of lone individuals is present in middle-aged adults (Gobush et al., 2008). These elephants would have been between 5-15 years old during the height of the poaching era which corresponds to the minimum age that elephants can survive without their mother (Poole, 1989). Orphaned elephants are affected by the lack of guidance and tend to have a lower reproductive output than individuals that have experienced maternal bonding (Gobush et al., 2008). Some studies have shown that effects caused by poaching are as relevant now as they were during the slaughtering era. Gobush et al., (2008) indicated that disruption in group size





is comparable to the mid-eighties when more recently, 30% of the population comprises singular elephants and right before the 1989 ban it was 33% percent (Poole, 1989). The selective loss of matriarchs will continue to have long-term impacts on population growth, social structure, and behavior that will extend the uncertainty of the future of the species (Archine and Chiyo, 2012; Mondol et al., 2014).

By eliminating the largest, most competitive males, poaching has altered the breeding age. Historically, the more experienced, larger, older males would out-compete younger males for reproductive advantage, but as bulls were eliminated for their tusks, the competition for younger males continually diminished (Cohn, 1990). This gap in selection of the most competitive, largest, and strongest individuals to pass on genes to future generations still has unknown consequences that only time can tell.

Between the lack in maternal guidance and selection against the most competitive genes, African elephants are at a severe disadvantage due to poaching. The decrease in reproductive output is obvious because of these implications.

Reproductive Patterns

There are several areas of Africa where elephants' breeding success has started to show severe reductions (Gobush et al., 2008) and reduced survival rates. Both males and females are reproducing earlier in life due to the void of mature elephants, but females lack the family units that heightens calf survival (Lee, 1987) and males have an increased likelihood for inbreeding (Mondol et al., 2014).

Before poaching affected populations, 95% of females below the age of 49 were either lactating or pregnant and the most reproductively active individuals were between 25-29 years of age (Whitehouse and Hall-Martin, 2000), but once poaching ensued the most fecund age dropped to 20-29 years-old

(Lee, 1987). By decreasing the age of the most active individuals, the age that females first give birth also plummeted due to poaching. The mean age for elephants to become new mothers after poaching was 11.3 years-old, while they did not start reproducing before they were 16 prior to the 1970's (Owens and Owens, 2009). Elephants between the ages of 8-14 represented over half the births after the 1980's, an age that was believed to be sexually immature before (Owens and Owens, 2009). Due to high social bonds and allomothering, these younger moms need family units more than ever. It will take several years to reestablish broken bonds and the high reproductive output associated with their social structure may never recover.

Females are not the only individuals with altered reproductive patterns. Males were the first ones targeted by poachers and, therefore, have started breeding much earlier in their life cycle. Due to the absence of large bulls and decreasing the amount of competition among males, the younger males became dominant breeding bulls at an earlier age. By lengthening the time a male is reproductively active, there is a greater chance for inbreeding with related females (Mondol et al., 2014). This overlapping of individuals can cause unknown repercussions to selected genes and the overall health of the population.

Sex Ratio

Males have become reproductively active at a younger rate due to the skewed sex ratios imposed by poaching. Naturally, males leave their family units when they are about 14-years-old (Lee and Moss, 1999) and they do not reach the height of their reproductive success until they are between 40 and 50 (Poole, 1989), but heavy poaching that targeted males has altered the ratio of males to females.

The implication imposed by reducing the number of males within the population drastically reduces the reproductive rates due to heightened difficulty of scarce males finding receptive females (Owens and Owens, 2009; Poole, 1989; Poole and Moss, 1989). This factor will continually affect reproductive output and the population's ability to recover, not to mention increase the threat of inbreeding by males finally finding a receptive female, even if that female is related.

Social Behavior

Elephants are a very intelligent, complex, matriarchal species that rely on mature female elephants as great knowledge resources (Gobush et al., 2008; Owens and Owens, 2009). Since matriarchs are the first females targeted in poached populations, there has been a substantial amount of information and experience lost between the generations;

such as where to find the best watering holes throughout the year and how to fight off predators (Cohn, 1990). Targeting older females has led to more than just a lack of information transfer, but it has also altered group functioning and increased stress among survivors.

The consequences of removing matriarchs from the species will not be known until a new generation of matriarchs have become intact (Gobush et al., 2008), but indications point to severe effects including reduced competitive ability, reproductive success, population growth, and a disruption in social structure (Mondol et al., 2014), all of which jeopardize the recovery of African elephants.

An average matriarch is over the age of 35 (Owens and Owens, 2009), but due to their shift in age structure it is indicated that these disrupted family groups have higher stress levels than prior to poaching. There are several aspects that can increase the level of stress, including weak social bonds, a fluctuating group structure, and the number of threats encountered per day. A study conducted in 2008 indicated that an area more prone to poaching before the ban still impacts an elephants' stress levels and lowers reproductive output (Gobush et al., 2008), indicating long-term effects of poaching. By decreasing the number of matriarchs within the population, poaching has added more stress and reduced viability within elephants. This indicates future problems for the species if they encounter other threats before they fully recover, if ever, from poaching.

Human Impact

Poaching in Africa has continued to be an issue beyond the generations, but the continued momentum that escalated in the early 2000's on an already decreasing population is reaching catastrophic measures (Anderson and Jooste, 2014). The effects of poaching will extend far beyond elephants, but also to the species that rely on them for habitat needs and resources, including humans. Wildlife tourism is a booming industry in Africa (Muth and Bowe, 1998) and the extinction of elephants would create a domino effect with other species to follow in their giant footsteps, potentially leading to an increased unemployment rate and citizens looking to illegal activity for work. Other species that have been heavily poached, such as rhinos, indicated a rise in illegal activity alongside the increase in poaching (Anderson and Jooste, 2014). Expanding the criminal networks and militia can only reap more havoc on a very fragile situation and should be avoided at all costs.

The only way to create a lasting impact is to decrease the demand for ivory. Historically,



social marketing has had successful attempts, such as the case of decreasing the demand for shark fin soup across Asia through conservation awareness campaigns (Anderson and Jooste, 2014). One survey shows that 70% of Chinese people did not know that tusks are removed from poached elephants and once they were aware, 40% had wavering thoughts on the purchase of ivory (Liljas, 2013). This indicates that a substantial change could be made if consumers were better educated on their products and that this should be the next action taken to help elephants. This is where zoological institutions come into play. Since they reach more than 600 million people annually, zoos potentially educate a considerable amount of people in a relatively short period of time (Anderson et al., 2003). By using this to their advantage, zoos can have a great effect on the demand for ivory.

Although reducing the demand is the outcome with the greatest impact, there are different tactics that can be taken to help ensure the future of African elephants including tusk alteration or removal, increased law enforcement units, continued legislation reform, and educational awareness. Education should be the focus, but several different attempts should be made to help reduce the threat as quickly as possible. In October 2013, over 300 African elephants were poisoned by poachers in a Zimbabwe national park (Thornycroft, 2013). Help cannot come soon enough for these massive animals and it is up to the human population to determine

the future of African elephants. Will human hands be the cause of their extinction? Will zoological institutions do all that they can to help counteract this tragedy?

Conclusion

With several threats altering the population of African elephants, it is essential to focus conservation efforts on this keystone species. Although current legislation such as CITES is helping deter some poachers, poaching problems still exist. With less than 600,000 individuals within the total population it is essential to minimize future reductions due to the continued issues poaching has caused (Gobush et al., 2008).


Large, bull elephants were the first targeted individuals, but as time progressed elderly females became the primary focus due to their comparable tusk size (Mondol et al., 2014). The long-term effect of minimizing the number of matriarchs within the population have started to become apparent a quarter of a century after African elephants received protection under CITES Appendix I. Issues involving the knowledge gap between matriarchs and younger females arose when group structures faded and the amount of isolated females increased (Owens and Owens, 2009). This has a direct correlation with the skewed sex ratio and the decrease in reproduction rates. Losing the mature individuals within the population has forced the average age of first time mothers to drop, as well as the age of reproductively active

males (Cohn, 1990). All of these occurrences affect the durability of the species to combat future disasters caused by human and natural causes.

By reducing the financial gain associated with the illegal killing of elephants, most of the incentive would disappear. The most successful way to change the social value of ivory is to educate the market on the effects imposed on African elephants (Liljas, 2013). This should be the main focus for future research and conservation efforts. Questions that still need to be addressed include: What are the most effective ways to reduce the demand for ivory? Do Asian citizens understand the impacts of poaching and does that affect their decision process while buying ivory? With the current population in steady decline since 2012, it is important for conservation efforts to be swift and strong before the profit from 'white gold' eliminates the African elephant population once and for all. With the impact zoos have on their surrounding communities, it is essential that they lead this effort and use the African elephants being imported as conservation ambassadors for the future of the species. By zoo professionals taking the time to educate visitors on the implications their actions have for the 96 elephants that are poached daily (# Go Grey for World Elephant Day, n.d.), the future for the African elephant can still be golden. Start now and participate in World Elephant Day, August 12.

References

- Amsel, S. 2005. Environmental Issues. Keystone Species - The African Elephant. Exploring Nature Educational Resource. March 27, 2015. <http://exploringnature.org/db/detail.php?dbID=7&detID=69>
- Anderson, B., and J. Jooste. 2014. Wildlife Poaching: Africa's Surging Trafficking Threat. *Africa Security Briefs* (28):1-8.
- Archie, E.A., and P.I. Chiyo. 2012. Elephant behaviour and conservation: social relationships, the effects of poaching, and genetic tools for management. *Molecular Ecology* 21(3):765-778. doi:10.1111/j.1365-294X.2011.05237.x
- Cohn, J.P. 1990. Elephants: Remarkable and endangered. *Bioscience* 40(1):10.
- Delsink, A., A.T. Vanak, S. Ferreira, and R. Slotow. 2013. Biologically relevant scales in large mammal management policies. *Biological Conservation* 167:116-126. doi:10.1016/j.biocon.2013.07.035
- Fraser, J., and J. Sickler. 2009. Measuring the cultural impact of zoos and aquariums. *International Zoo Yearbook* 43(1):103-112. Retrieved September 23, 2014. doi:10.1111/j.1748-1090.2008.00064.x
- Gao, Y., and S. Clark. 2014. Elephant Ivory Trade in China: Trends and Drivers. *Biological Conservation* 180:23-30.

- Gobush, K.S., B.M. Mutayoba, and S.K. Wasser. 2008. Long-Term Impacts of Poaching on Relatedness, Stress Physiology, and Reproductive Output of Adult Female African Elephants. *Conservation Biology* 22(6):1590-1599. doi:10.1111/j.1523-1739.2008.01035.x
- The History of the Ivory Trade. (n.d.). Retrieved March 18, 2015, from http://education.nationalgeographic.com/education/media/history-ivory-trade/?ar_a=1
- Lee, P.C. 1987. Allomothering among African elephants. *Animal Behavior* 35:278-291.
- Lee, P.C. and C.J. Moss. 1999. The Social Context for Learning and Behavioral Development Among Wild African Elephants. *Mammalian Social Learning*. Cambridge University Press, Cambridge.
- Liljas, P. 2013. The Ivory Trade Is Out of Control, and China Needs to Do More to Stop It. *Time.Com*, 1.
- Miller, J. 2005. Biodiversity conservation and the extinction of experience. *Trends In Ecology & Evolution* 20(8):430-434. doi:10.1016/j.tree.2005.05.013
- Mondol, S., C. Mailand, and S. Wasser. 2014. Male biased sex ratio of poached elephants is negatively related to poaching intensity over time. *Conservation Genetics* 15(5):1259-1263.
- Muth, R.M., Bowe, Jr. 1998. "Illegal harvest of renewable natural resources in North America: Toward a typology of the motivations for poaching". *Society & Natural Resources* 11(1): 9-24. doi:10.1080/08941929809381058.
- Owens, M., and D. Owens. 2009. Early age reproduction in female savanna elephants after severe poaching. *African Journal of Ecology* 47:214-222.
- The Poaching Problem. (1997, November 16). Retrieved March 17, 2015, from <http://www.pbs.org/wnet/nature/elephants-africa-poaching-problem/11367/>
- Poole, J.H. 1989. *Final report to the African Wildlife Foundation: the effects of poaching on age structures and social and reproductive patterns of selected east African elephant populations*. In: The Ivory trade and future of the African elephant. Second meeting, CITES African elephant working group, Gabarone, Botswana.
- Poole, J.H. and C.J. Moss. 1989. Elephant mate searching, group dynamics and vocal and olfactory communication. *Symp. Zoological Society of London* 61:111-125.
- Thornycroft, P. 2013. "Poachers kill 300 Zimbabwe elephants with cyanide". London: Telegraph.co.uk. Retrieved November 27, 2013.
- Vandegrift, J. 2013. Elephant Poaching: CITES Failure to Combat the Growth in Chinese Demand for Ivory. *Virginia Environmental Law Journal* 31(1):102-135.
- Whitehouse, A., and A. Hall-Martin. 2000. Elephants in Addo Elephant National Park, South Africa: Reconstruction of the population's history. *Oryx* 34(1):46-55. doi:10.1046/j.1365-3008.2000.00093.x
- #GoGrey for World Elephant Day! (n.d.). Retrieved April 01, 2016, from <http://pages.96elephants.org/wed/> 



6TH INTERNATIONAL
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Hatching a Plan for Gopher Tortoises

Michelle Little, Head Keeper
Alabama Gulf Coast Zoo
Gulf Shores, Alabama

The gopher tortoise (*Gopherus polyphemus*) is an icon of the south, and the only native tortoise found east of the Mississippi River. Habitat loss and human predation have taken a great toll on this keystone species, which is federally listed as threatened in the western extreme of their range. Over 300 other species are known to take shelter in gopher tortoise burrows, including declining and protected species such as the burrowing owl, Florida mouse, Eastern Indigo snake and gopher frog. Loss of gopher tortoises can have a profound negative impact on their habitat.

The Alabama Gulf Coast Zoo houses a pair of adult gopher tortoises in a naturalistic exhibit in their native habitat. These tortoises require very little interference from keepers, spend much of their time in burrows, and are often secretive in their habits. Therefore it came as a surprise when, on 23 August 2016, we found nine gopher tortoise hatchlings exiting a burrow in the exhibit. Our gopher tortoise exhibit was not built to contain hatchlings, and we had to collect them before they wandered into the nearby wetlands. We were also concerned that

the existing burrows were not sufficient for the hatchlings to overwinter in, so leaving the hatchlings on exhibit was not an option. Considering the current status of the gopher tortoise in the wild, we wanted to find a way to release the hatchlings.

In Baldwin County, the gopher tortoise is protected as a nongame species by the state of Alabama, but is not federally listed. Before we could release our hatchlings into the wild, we needed permission from the Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries (DCNR). Our Curator, Cyndi Johnson, contacted Roger Clay, the DCNR wildlife biologist in charge of gopher tortoises for the area, who gave us clearance to continue with our plan.

Next we needed a release site for our hatchlings with plenty of suitable habitat, including access to established but vacant adult gopher tortoise burrows where they could overwinter. To find this habitat we reached out to Wade Stevens, the Operations Manager for the City of Orange Beach



The hatching of a native, protected species offered a unique opportunity for us to get started. In the future, we hope to continue to partner with the City of Orange Beach on further gopher tortoise conservation projects.

Coastal Resource Division. The City of Orange Beach, in partnership with the Gulf State Park, has approximately 7,000 acres of almost entirely undeveloped land along the Hugh S. Branyon Backcountry Trail, a fifteen mile complex of trails accessible only to non-motorized vehicles. This area includes prime gopher tortoise habitat and has both active and inactive gopher tortoise burrows.

Our last step was to find someone permitted by the state of Alabama to relocate gopher tortoises. Lewis Cassidey, a biologist from Ecosolutions Inc., a local environmental consulting firm, volunteered to help.

With our plan in place and final approval from the DCNR, we released the hatchlings on 8 September 2016. Along with myself, Cyndi Johnson, Wade Stevens, and Lewis Cassidey, we were also accompanied by Mike Kimmerling, Environmental Services Coordinator for the City of Orange Beach, and David Frings, Associate Director of the Environmental Management Program at Samford University.

We chose three release sites along the Backcountry Trail, and released three tortoises at each site. Each site had at least one established gopher tortoise burrow. We also provided starter burrows for the hatchlings, in case they chose not to use the adult burrows. Some of the hatchlings went into the adult burrows with minimal encouragement, and some preferred the starter burrows. One refused both and immediately started working on a new burrow. All were eagerly feasting on native plants when we left them in their new home.

Coastal Alabama is an astonishingly beautiful place, and our local ecosystem is facing many environmental challenges. As a small non-profit facility, we have struggled to find a way to get involved with local conservation efforts. The hatching of a native, protected species offered a unique opportunity for us to get started. In the future, we hope to continue to partner with the City of Orange Beach on further gopher tortoise conservation projects. 🐢

AAZK AWARDS

2017 recognizing excellence
in the field of animal care



Lifetime Achievement Award

Kathy Brader started her career in the bird house at Smithsonian's National Zoo in 1986. Her accomplishments in her 30 years of service have been immeasurable. While she has an immense amount of dedication to all the animals she has worked with, her passion lies with the North Island brown kiwi.

Since 2005, Kathy has been the Brown Kiwi SSP Coordinator and Studbook Keeper for AZA. She has successfully hatched and raised 3.3 brown kiwi at the Smithsonian National Zoo. AZA even awarded Kathy the Plume Award for the Avian Scientific Advisory Group for Exceptional Individual Achievement in Avian Husbandry in 2012.

Kathy works directly with the New Zealand Embassy and the New Zealand Department of Conservation creating strong relationships and resources for the proper welfare and conservation of kiwi. Upon realizing the cultural value of kiwi feathers, Kathy implemented the Kiwi Feather Program. This program allows her to collect molted kiwi feathers from institutions around the world and repatriate them to New Zealand for Kaha Kiwi (a traditional Maori kiwi feather cloak). In addition to this program, she contributes to the nonprofit, Kiwis for Kiwi. Kathy was fundamental in creating the only "Meet A Kiwi" program in the U.S. This program has been so successful and valuable for members of the public, that it was honored by the New Zealand Prime Minister in 2015. In addition, Kathy has been appointed as an Honorary Member of the New Zealand Order of Merit for her commitment to the conservation of this species.



Kathy Brader

Kathy has been able to impart her knowledge by mentoring young zoologists in the field and most recently has guided a new keeper in the successful hatching of two kiwis at the Smithsonian Conservation and Biology Institute. When she is not at the zoo, she volunteers her time with Roger Jones as a bird bander for birds of prey and at City Wildlife, assisting with hand-rearing chicks.

Kathy is a member of the Audubon Society, International Wild Waterfowl Association, AZA and, of course, AAZK. She has been a member of AAZK for more than 30 years and was awarded a merit in conservation in 2014. She ensures the vast amount of information she has gained is spread by presenting on the brown kiwi at several AAZK conferences.

As an accomplished keeper and conservation advocate, Kathy Brader's devoted career is an inspiration.

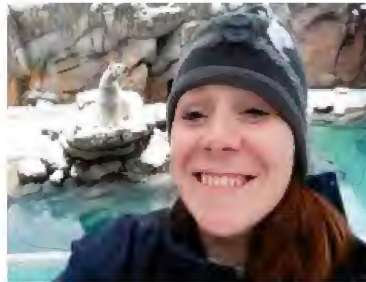




Susan Gurley



Kris Vehrs



Nicole Pepo

Lifetime Achievement AAZK Meritorious Service Award

Susan Gurley, San Francisco Zoo. You have been selected by your peers and superiors for your outstanding commitment to professionalism in your distinguished 27-year career as a zoo keeper. You have had success breeding Gila Monsters, Roadrunners and Ringtail Cats, worked mainly as a carnivore keeper and was the primary trainer for Uulu, a 36-year-old polar bear. Specifically noted is your having served for over 20 years on the Awards Committee. You have been a mainstay of the committee and have given informative opinions, suggestions and judicial judgements for many years. You are the consummate professional.

Kris Vehrs, Association of Zoos and Aquariums. The American Association of Zoo Keepers is honored to recognize your outstanding career, service and contributions to the zoological community. Especially noted are your contributions as Principal Executive Vice President, Interim President for the Association of Zoos and Aquariums, and your commitment to maintaining the highest standards of animal welfare and accreditation in the zoo and aquarium industry. Through the development of conservation programs such as AZA SAFE and as a Trustee for Species360, you have shown your dedication to advancing efforts to save wildlife from extinction. Your distinguished career earns the respect and recognition of all members of the zoological profession.

Lutz Ruhe Meritorious Achievement - Professional of the Year Award

Nicole Pepo, North Carolina Zoo. This award is in recognition of her outstanding commitment to professionalism during her distinguished career as a zoo keeper. Specifically noted is her extensive involvement with AAZK, national and local, North Carolina Zoo's AAC Team, Training Resource Team and her promotion of conservation and ability to spread awareness of environmental issues. She promotes conservation through outreach and education, but also practices this herself by participating in and organizing events such as tree plantings with the Asheboro community. Nicole has shown that aspirations can be achieved through her drive to take on any challenge or opportunity presented that will improve the lives of the animals under her care as well as their wild counterparts.

Jean M. Hromadka Excellence in Animal Care Award

Danila Cremona, Los Angeles Zoo. This award is based on her extensive efforts to provide excellent care for red uakari monkeys. She has improved the lives of the red uakari housed at Los Angeles Zoo as well as rescued wild uakari at the Pilpintuwasi Rescue Centre. She is recognized for her dedication to researching wild diets and care, she is inventive with enrichment and shares her knowledge by working with high school students, presenting at conferences and through Animal Planet Live Streaming. Furthermore, her devoted activity in AAZK has greatly benefited uakari, as well as numerous other species worldwide.



(Top)
Danila Cremona
(bottom L to R)
Ann Knutson
Brooke Stowell

Nico van Strien Leadership in Conservation Award

Ann Knutson, San Diego Zoo, for raising considerable funds for various causes: most notably the plight of the African Vulture. Not only have funds been raised but also critical awareness for the vulture has been shared both in the states and in Kenya. She received the AZA CGF grant to continue her work and has brought other zoos on board as well. In addition to her fundraising efforts, she currently serves as the San Diego Zoo AAZK Chapter President.



Animal Nutrition Award

Brooke Stowell, Fresno Chaffee Zoo, for updating and renovating the diet protocol for the avian species at her facility. She completed extensive research on species' natural history and collaborated with the veterinarian, nutritionist and keepers to implement a commissary system that benefits the welfare of the animals and the keepers.

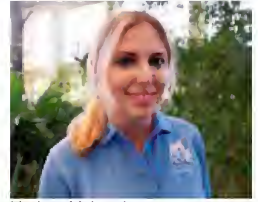
Lee Houts Advancement in Enrichment Award

Lindsey McLaurin and Hilda Tresz, North Carolina Aquarium at Fort Fisher and Phoenix Zoo, for their collaboration to create a new enrichment device and training programs for elasmobranchs in a touch pool setting. These devices and programs allowed for animal 11615, a cownose ray, to become the first ray to carry an underwater camera on cue. The end goal, with continuation of the enrichment and training program, is for restraint-free barb trim, ultrasound, and injection training.

An Nguyen, Denver Zoo, for his work to establish a zoo teen enrichment intern program for the Predator Team and for working on increasing space for a variety of exhibits, most notably the Asian small-clawed otters and fishing cats. An has also utilized broken enrichment from other areas in the zoo to provide "new" items for the Predator animals.

Nikki Maticic, Smithsonian's National Zoological Park, for the great passion she shows for all animals in her care - including 0.4 Leghorn Chickens. She uses innovation and creativity to provide enrichment to combat the issue of bumblefoot and with the development of a goal-based enrichment plan to provide opportunity for displacement behaviors. All this has showed a decrease in foot issues, increased foraging behavior, and less territoriality between the flock.

Commissary Team (Brian Cannon, Chelia Char, Tyrone Savoy, Albert Olson, Chris Stout, Coral McDonald, Stephen Schulze, Brittany Hudgins, Mike Kirby, Lori Smith), Smithsonian's National Zoo, for their work with various food enrichments offered to zoo animals. They work with all units, across taxa, to provide enrichment with some form of diet components - utilizing the normal diet in new and interesting ways to promote natural behaviors.



Lindsey McLaurin



Hilda Tresz



An Nguyen



Nikki Maticic



Smithsonian's National Zoo
Commissary Team



Reptile Discovery Center,
Smithsonian's National Zoo

Certificate of Excellence in Exhibit Renovation

Reptile Discovery Center (Zoo Keepers: Matt Neff, Lauren Augustine, Michael Miller, Robin Saunders, Kyle Miller; Assistant Curator: Matt Evans; Curator: Alan Peters), Smithsonian's National Zoo, for the creation of their innovative and diverse salamander exhibit. They are being recognized not only for their exhibit that highlights the local fauna and allows for the occurrence of natural behaviors, but the extra effort put forth to promote conservation in your own backyard as well as share and inspire others through the use of technology and social media.

Certificate of Merit for Zoo Keeper Education

Endangered Wolf Center Animal Care Team (Tracy Rein, Emma Miller, Sarah Holaday, Danielle Rosenstein), Endangered Wolf Center, for creating a handling and husbandry workshop for Red Wolf and Mexican Grey Wolves. At the workshop, keepers gain knowledge on a variety of topics ranging from diet and enrichment to breeding and geriatric care. Keepers get hands-on experience at the workshop by participating in annual exams for the wolves at the center. The workshop is free to Red Wolf and Mexican Grey Wolf keepers or keepers from facilities looking to acquire one of the species. The past three years the workshop has been filled to capacity.

Michael Crocker, Dickerson Park Zoo, for going above and beyond to ensure his staff has access to professional development opportunities. Not only does he make professional development a budget priority but he discusses career goals with his staff. In 2016, the budget for staff development was \$41,000 and roughly half was used for animal care and keeper staff training. These opportunities are not just for full-time staff but part-time staff can benefit as well. In addition to making sure keepers attend the AAZK conference every year, keepers can also participate in the AZA managing for success classes.

Training Resource Team (Bria Stambaugh, Nicole Pepo, Dana Urbanski, Tamara Trull and Kelly Nields), North Carolina Zoo, for developing a training resource for keepers at the zoo. Through this group new trainers are able to seek advice from experienced trainers. All keepers are able to ask for advice and guidance in between visits from their behavior consultant. The team meets monthly to discuss training issues and all keepers are invited to attend. The team also puts out a monthly newsletter highlighting training successes which has boosted morale amongst the keepers.

Hilary Colton and Chelsea Grubb, Smithsonian's National Zoo, for initiating and creating ethical discussions to talk about current hot topics in the field. Being a large government organization the process was long but they persevered and brought these discussions to life. Topics included Maintenance of Orcas in Captive Environments and Management Euthanasia. Over sixty animal care and education staff attended their first discussion.

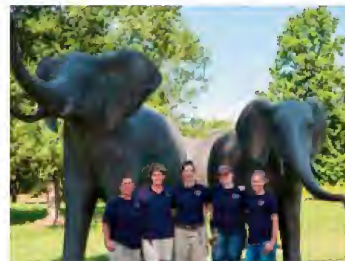
Greater Baltimore AAZK Chapter, Maryland Zoo in Baltimore and The National Aquarium, for their dedication to offering professional development opportunities to their members. The Chapter maintains a budget of \$1000 each year in their professional development fund. In 2016, the Chapter funded ABMA, two AAZK conference trips and a keeper exchange with the NC Zoo. In addition to conference trips, the Chapter also offers educational talks at each meeting and facilitated a zoo and aquarium keeper exchange program.



Endangered Wolf Center Animal Care Team



Michael Crocker



Endangered Wolf Center Animal Care Team



Hilary Colton and Chelsea Grubb



Greater Baltimore AAZK Chapter

Certificate of Appreciation

Smithsonian National Zoological Park

2017 AAZK National Conference Host Institution

Distinguished Service Award

National Capital Chapter

2017 AAZK National Conference Host Chapter

Barbara Manspeaker Chapter of the Year Award

Saint Louis AAZK Chapter

St. Louis Zoo



Certificate of Recognition

Penny Jolly

Disney's Animal Kingdom

for serving on the AAZK Board of Directors
and as President for two years

Dennis Charlton

Smithsonian's National Zoo

for serving on the AAZK Board of Directors

Rachael Rufino

Smithsonian's National Zoo

for serving on the AAZK Board of Directors

Melaina Newcomer

Disney's Animal Kingdom

for serving as Chair of the Professional
Development Committee

Zachary Page

Pueblo Zoo

for serving as Chair of the Communications
Committee

Janez Zakoren

Denver Zoo

for serving as Vice Chair of the Conservation
Committee

Dawn Neptune

Hogle Zoo

for serving as a Chair and long-term
Advisor of the Behavioral Husbandry
Committee and as one of the original
members of the Committee.

Dawn Neptune

Hogle Zoo

for serving as a Co-Editor of the Animal
Keepers' Forum Enrichment Options
column.

Dennis Charlton

Smithsonian's National Zoo

2017 National AAZK Conference Co-Chair

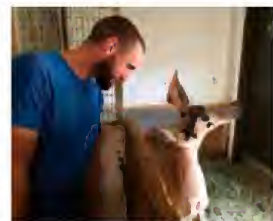
Kenton Kerns

Smithsonian's National Zoo

2017 National AAZK Conference
Chair



Penny Jolly



Dennis Charlton



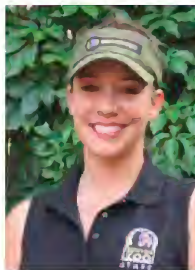
Rachael Rufino



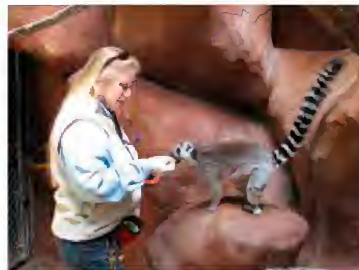
Melaina Newcomer



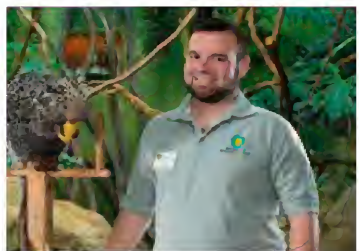
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Janez Zakoren



Dawn Neptune

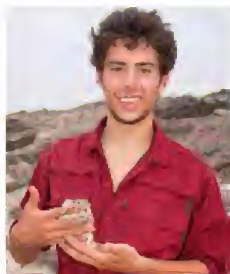


Kenton Kerns



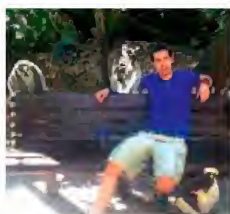
AKF AWARDS

Celebrating **excellence** in journalism and photography



Photographer of the Year

Todd Pierson, University of Tennessee
Blue Ridge Two-lined Salamander,
August 2016



Excellence in Photography

Ethan Riepl, Saint Louis Zoo
Swamp Monkey, November 2016



Susan D. Chan Author of the Year

Elana M. Kopel, Kim Daly-Crews, and
Dr. Lara Metrione, Jacksonville Zoo and Gardens
Location and Activity Preferences of Tigers
Living in a Complex Habitat



Elana Kopel, Dr. Lara Metrione, and Kim Daly-Crews.

Excellence in Journalism Awards

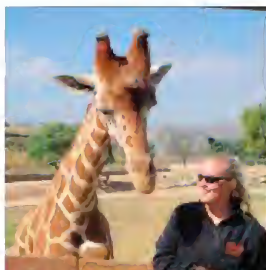
Leah Perlman, San Diego Zoo Safari Park
Evolution and Natural History of Langurs: Implications for Welfare

Ashleigh Kandrac and Kim Wuenstel, Lion Country Safari
Demonstrating What Comes Naturally: Showcasing the Natural Behaviors of Giraffe (*Giraffa Camelopardalis*) at Lion Country Safari's Giraffe Encounter Exhibit.

Heidi Eaton, Cheyenne Mountain Zoo
Hadhiah and Ember's Story: Reintroduction of a baby orangutan to her mother after only 17 days

Barbara Heidenreich, Barbara's Force Free Animal Training
Weight Management in Animal Training: Pitfalls, ethical considerations and alternative options

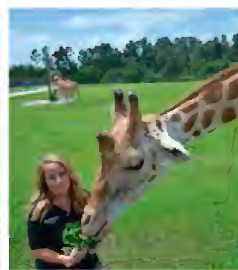
Linda Henry, Sea World San Diego
In the Eye of the Beholder: How do birds see the light we give them?



Leah Perlman



Ashleigh Kandrac



Kim Wuenstel



Heidi Eaton



Barbara Heidenreich



Linda Henry

A Spoon Full of Sugar Doesn't Always Make the Medicine Go Down: A Guide to Syringe Training and Voluntary Oral Medication in Giraffe

Kimberlee Wuenstel, Lead Trainer
Lion Country Safari
Loxahatchee, FL

Abstract

Animal care professionals today commonly rely on training using positive reinforcement principles to help care for their animals' health, husbandry and housekeeping needs. Animals are trained to station, target, stand on a scale and voluntarily participate in medical procedures including examinations, vaccinations and blood collections. Yet when it comes to oral medication, delivery can be one of the easiest or the most challenging parts of an animal caregiver's day. Some medications you can simply hide in the diet or a favored food item the animal will consume without hesitation. However, medications prescribed in large quantities, having an unpleasant taste or a strong odor can prove to be challenging to administer. Once you have unsuccessfully tried every food type or method to disguise the medication, the animal may become hesitant to eat anything you offer because they may consider it "tainted." This trickery of hiding medication in food may lead to distrust, and distrust may lead to a breakdown in the animal's participation and the animal-caregiver relationship.

So why not employ basic positive reinforcement training principles when it comes to orally medicating? This paper will discuss the shaping plan used to successfully train, medicate and maintain a syringe behavior for a herd of 11.9 giraffe (*Giraffa camelopardalis*) ranging in age from 7 months to 17 years at the time of training. The implementation of this training program at Lion Country Safari has allowed for continuous, long-term oral medication delivery in a safe and positive way that will ensure the giraffe willingly participate and receive the best veterinary care possible.

Introduction

At Lion Country Safari (LCS) in Loxahatchee, FL, a parasite known as *Haemonchus contortus*, which feeds on the host's blood while residing in the abomasum of ruminants, is prevalent in the pastures where the giraffe are housed. Severe infestations could lead to anemia, "bottle jaw" and even death in the infected animal if left untreated (Leite-Browning, 2006). A combination of the sub-tropical climate that is favorable for *H. contortus* development, an increase in grazing by the giraffe and resistance to standard de-worming medications have made this resilient parasite difficult to manage. However, through the use of both proactive and reactive measures, changes in the management and treatment of the giraffe herd have minimized the severity of infestations and the health risks associated with it. Moxidectin is the only de-wormer found to

be effective in killing *H. contortus* parasites at LCS (Kandrac, 2011). Oral moxidectin, currently prescribed in the form of Quest® gel (2% Equine Oral Gel. Zoetis Inc. 333 Portage St. Kalamazoo MI, 49007 USA. (269) 359-4414. www.zoetis.com), has been shown to have a good success rate in the treatment of this parasite and is the preferred treatment over its topical and injectable counterparts by our veterinarian.

This medication however has three negative attributes that initially prevented it from being easily administered: it has an unpleasant taste, strong odor and is prescribed in large volumes. Some giraffe at LCS were hesitant to consume even a pea-size amount hidden in their diet. Those which did not refuse required a large amount of food to disguise the scent and flavor of even the slightest amount. However, due to the large volume of medication, this was not a viable option as the food-to-medication ratio was more than the giraffe would be willing to consume at one time. Caregivers were left with few options and no safe way to deliver medication if the giraffe refused to consume it. LCS does not have a giraffe restraint device to aid in forced oral medication delivery and has a philosophy of favoring positive reinforcement techniques to encourage voluntary participation in veterinary care and procedures. While this behavior was predominantly trained to ensure oral moxidectin medication could be delivered in the event of a parasitic infestation, the behavior is not limited to any specific oral medication, and other medications have been successfully administered.

Training

Giraffe are trained using a 60mL syringe filled with 50mL of mashed banana. Banana is the easiest to puree, squirt without clogging and closely mimics the sound the actual medication makes. Future alternatives we aim to try are mashed sweet potato, apple sauce and canned pumpkin. Syringe contents are just as important as reinforcement, so time and testing is needed to ensure training doesn't cause regression. Also, giraffe were initially reinforced with 3-4 whole or halved bananas, but have since also been reinforced with sweet

Image 1: Cut up pieces of banana are fed to Ayanna off of the tip of the syringe.

Image 2-5: Shows progression of the syringe being inserted into Manowari's mouth and contents squirted into cheek.



Image 1



Image 2



Image 3



Image 4



Image 5

potato wedges, romaine lettuce hearts, and/or apple wedges in order to decrease banana consumption.

SHAPING PLAN

1. Establish a station (preferably an elevated platform). This is where all initial training will occur and the location the animal will eventually be medicated from. Reinforce the giraffe for standing at the station.
2. Desensitize the giraffe to the sight of the syringe by holding the syringe in one hand while reinforcing with the other.
3. Feed cut up pieces of reinforcement off the tip of the syringe (See image 1). This will help the giraffe get used to the feeling of a large syringe in their mouth furthering the desensitization process.
4. Once the giraffe is eagerly taking food off the syringe and doesn't negatively react to the syringe tip being in their mouth, progress to holding reinforcement in one hand and the syringe in the other directly in front of the animal's lips.
5. Holding the reinforcement in a fixed position (as if targeting the head) move the syringe closer and closer to the animal's mouth in approximations until the syringe is touching their lips, then deeper into the mouth until the syringe is inserted into the back cheek area (See image 2-5). The syringe should be positioned straight back, not on an angle, which might cause the contents to be squirted out the opposite side of the mouth.
6. Introduce mashed contents into the syringe which are known to have a pleasing flavor. Using the same syringe-reinforcement positioning, begin squirting small amounts into their mouth/cheek letting them initially taste the contents reinforcing after the syringe is removed from the mouth.
7. Once the animal does not react to small squirts, continue to increase the amount delivered into the mouth from $\frac{1}{4}$ to $\frac{1}{2}$, $\frac{3}{4}$ to a whole syringe, in successive sessions. Before advancing to each level you should successfully be able to deliver the syringe's contents into the giraffe's mouth in one squirt at a normal to fast speed without any reaction.
8. Once able to completely deliver entire syringe contents with no reaction, start to increase the length of time in between the squirt and the reinforcement to encourage the giraffe to swallow the syringe contents until eventually reinforcing after the swallow. This will ensure when medicating their first instinct is to swallow.
9. Randomly deliver contents between the first, second and third time the syringe is inserted into the mouth to prevent anticipation of the squirt.
10. From this point training is considered complete and if stable the contents of the syringe could be replaced with oral medication once prescribed by the veterinarian.

Throughout the training process possible negative reactions that we have encountered are: turning or pulling their head away, backing up, not letting the syringe be inserted into the mouth, distrust of the taste causing mouthing of the contents, spitting out the syringe contents, walking away or having an unwillingness to participate. If any of these reactions occurred, we slowed the training speed and spent more time on each step until there was no longer a reaction. The whole process on average took between two weeks to a month to completely train each giraffe before medication could be successfully delivered. The behavior was also cross-trained between all giraffe caregivers and was shaped to allow the contents of the syringe to be both cold and room temperature to allow for variation in possible medications.

MEDICATING

When medicating, everything is replicated exactly as trained but instead of being filled with mashed produce, the syringe is prepared with only enough produce to fill the tip of the syringe to prevent medication from



leaking out and to mask any smell, and then filled with the medication (See image 6).

By having the negative taste associated with the syringe and not the reinforcement, it is then easy to bring back the behavior because no trust was lost in the most important part of the training process, the motivator. After medication is administered, the giraffe may be hesitant to allow the syringe in their mouth or react to the squirt by tasting or spitting. Training sessions are done daily until the behavior is once again stable and consistent using an abbreviated version of the above steps. Once readily accepting the syringe and swallowing the contents, the behavior is returned to the normal maintenance schedule. This "bring-back" process usually takes about a week.

MAINTAINING THE BEHAVIOR

Depending on the frequency in which the giraffe is medicated, maintenance training varies between weekly or monthly and typically only takes five minutes per giraffe. However, that training is rotated between all cross-trained keepers. For example, a giraffe that is trained weekly with four cross-trained caregivers will only require one session per month per caregiver. This increases the likelihood the caregiver will have time to participate in the training sessions and give flexibility so the giraffe is not dependent on any one person being present to medicate.

LESSONS LEARNED

Throughout the training and medicating process we have learned that the station should preferably be next to an elevated platform for the

Medication Number		Manowari	Cupid	Ayanna	Bahkari	Angaza	Tambo	Mosi	Jabari	Bobby	Ukubwa	Tuli	Willow	Nafari	Lily	Pammella	Ashleigh
	1	95	100	100	90	95	100	100	100	100	100	95	100	100	100	100	100
	2	100	90	90	90	100	100	90	100	100	90	100	100	100	75	100	100
	3	100	75	100	20	20	100	100	100	100	100	75	100	100			
	4	95	100	100	50	100	100	100	100								
	5	100	100	100	100	100	100	75									
	6	100	100	100	100	95											
	7	95	100	100	90	100											
	8	100	100	90	100												
	9	95	100	100													
	10	100	100														
	11	100	100														
	12	100	100														
	13	100	100														
	14	100	75														
	15	100	100														
	16	100	65														
	17	100	95														
	18	5	100														
	19	90	95														
	20	95	100														
	21	100															
	22	80															
	23	100															
	Percentage of Dose Administered																

Table 1 depicts the actual dosage received for each medication.

caregiver to stand on, allowing the giraffe's head and neck to remain outstretched rather than downward if caregiver was standing on the ground. This will prevent the whole dose of medication from "falling" back out of the giraffe's mouth if their head was in a downward position. We have found that our giraffe are calmer, less suspicious and have a greater willingness to participate if the station is in an area of the exhibit where the animal is not restrained or confined (i.e. chute). Also, we have observed that medication which was given in an area differing from their syringe training station often resulted in lower success rates.

While training this behavior, we tried several variations in our syringe contents including air, water, juice and mashed produce. Air alone did not allow us to desensitize the giraffe to the feeling of something squirted into their mouth and the important step of swallowing. Water and juice accomplished these goals but sometimes proved more difficult and slowed the training process for some giraffe that disliked liquid dripping out of the syringe prior to the squirt. Additionally, water and juice did not produce the same force necessary to push the plunger and squirt the contents that the medication required. Using mashed produce helped the animal caregivers mimic the needed feeling or force for medication delivery and furthered our giraffe desensitization by producing a similar sound the medication makes when squirting through the syringe.

Lastly, we experienced a difficult time in progression with one adult female giraffe on a single step; feeding cut pieces of produce off the syringe. While she would willingly come over and participate in training and eagerly eat whole bananas, once the banana was broken or cut

she would no longer eat it and would walk away. It was assumed that after years of having medication hidden in her produce, once a banana was altered (in this case cut) she appeared to expect it to be tainted. By skipping this step and progressing to the next using whole produce she was successfully trained without any other setbacks.

Discussion

Sixteen out of the twenty trained giraffe have received medication orally through a syringe. Since 2010, medication has been delivered a total of 102 times with an average success rate of 94% of the prescribed dose being administered (Table 1) with 100% of the dose being administered 71% of the time (Figure 1). The giraffe "Manowari" and "Cupid" have been identified as being the most susceptible to *H. contortus* and required frequent de-worming treatment; 23 and 20 times respectively since 2010 (Figure 2). Despite the higher frequency of medication, both still have an average success rate similar to the herd's 94% with Manowari averaging 93.5% and Cupid 95% of the prescribed dose being successfully administered. These results demonstrate with proper training and maintenance, this behavior can be used as a long-term option for treatment (Table 1).

While the majority of the medication that has been delivered using the syringe method has been moxidectin, other drugs have been successfully administered. The giraffe "Bahkari" was medicated daily for seven consecutive days with the drug TMS (Sulfamethoxazole and Trimethoprim Tablets, USP 800mg/160 mg, Amneal Pharmaceuticals of NY, Hauppauge, NY 11788 USA) dissolved in water. While the initial

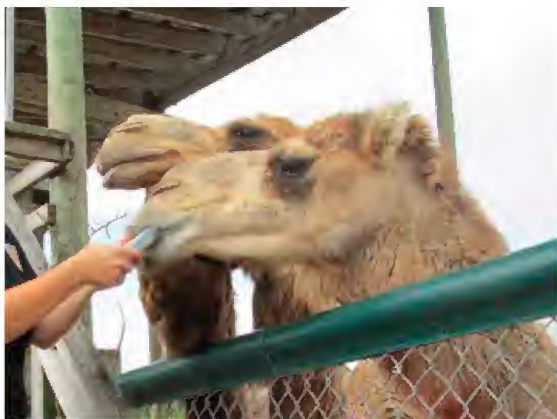


Image 7: This training method can be used on a variety of animals. Shown with our dromedary camel Bin.

two doses delivered were 100%, the following two doses resulted in only a 20% and 50% success rate. By adding a second training session (syringe contents banana mash only) in each day we were able to achieve a 90-100% medication delivery rate for the remainder of the treatment period (Table 1).

Conclusion

Using this training method, the animal care staff has been able to successfully administer medication while maintaining a positive animal-keeper relationship and trust in food items offered while increasing safety and decreasing animal stress. This process was also used to train a 1.0 dromedary camel (*Camelus dromedarius*) to accept voluntary oral medication demonstrating that it is possible to train a variety of animals using this same method.

Acknowledgements:

I would like to thank Ashleigh Kandrac, Elizabeth Hammond, D.V.M., David Backus, Kimberly Good and the rest of the wildlife staff at Lion Country Safari for their support and commitment to the development and implementation of this training program, ensuring its success and for their dedication to the health of the giraffe.

Portions of this paper were presented at the 2016 AAZK, Inc. National Conference.

Photos by author.

References:

- Kandrac, A. 2011. Teaching Young Giraffe Old Tricks: Changing Learned Behaviors in a Herd of Captive Giraffe. *Animal Keepers' Forum* 38(7/8):286-291.
- Leite-Browning, M.L. 2006. *Haemonchus contortus* (Barber Pole Worm) Infestation in Goats. Alabama Cooperative Extension System, Alabama A&M and Auburn Universities, 78.

Contact:

Kim Wuenstel, Lead Trainer
Lion Country Safari
2003 Lion Country Safari Rd.
Loxahatchee, FL 33470
561-793-1084 ext. 2341
kim.wuenstel@lioncountryzoo.org 

BHC Comments by Kim Kezer

This Training Tale is an example of a well thought out approach, setting up the animals and all the caregivers involved for success! All too often when medicating an animal, they quickly become wise to the medicated food, taking us down a slippery slope of bribery, trickery and suspicion that negatively impacts the animal/keeper relationship. Training here was done building trust and confidence, without compromising the relationship with the animal. Not only was there a schedule for the keeper staff to be cross-trained with multiple animals to ensure medication was delivered consistently, there was also a maintenance schedule for the behavior and a plan to rebuild or "bring back" the behavior, anticipating possible regression.

Addressing regression, and subsequent reinforcement, is critical to the successful shaping of the syringe feeding behavior (and any trained behaviors, for that matter). What does the reward value convey to the animal? Too often I see people miss key opportunities to better communicate to the animal using the quantity or quality of reinforcement. Differential reinforcement allows us to do just that. The moment the animal progresses to the next phase or step of the shaping plan, once bridged, they should be heavily reinforced with a jackpot. As the behavior develops, if the animal does the old version, which is less technically correct, the animal will still be reinforced but certainly not as heavily as it was previously. Advanced steps towards the final goal always receive higher quality/quantity rewards than earlier steps. Eventually, the animal will no longer be reinforced for the lesser step, understanding the new expectations. Keep this in mind for your next training session; I bet you will see faster results when you use your reinforcement as a way to communicate to the animal. Well done and thank you for your Training Tale!

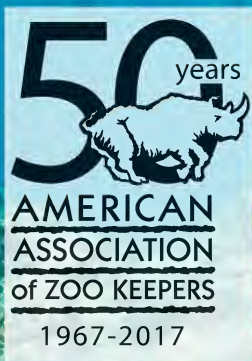
We want to hear your Training Tales: the good, the bad and the fabulous!

Did you enjoy the latest Training Tale? Was this information useful or inspiring? Do you have any operant conditioning experiences that others would benefit from reading? Please submit your "Training Tales" and experiences in operant conditioning to share with *Animal Keepers' Forum* readers. This opportunity provides a convenient outlet for you to exhibit your training challenges, methods and milestones with the AAZK member network. Please submit entries based on the following guidelines:

- a. Submit a brief description of a training project at your facility. These can be 500 words or less, in text or bullet points – it can be longer (up to 1000 words); however, short and simple descriptions with a few images are just as perfect. Details should include the following:
 1. Define the training goal (what did you try to do and for what purpose?)
 2. List important steps (How did you do it – include plans that changed along the way/what worked and what didn't work)
 3. Timeline used (how long did it take)
 4. Tips you learned along the way
- b. Include 3-5 digital photos that clearly depict the animal in the learning process or performing the desired goal (provide photo caption and photographer of each image). Photos need to be 300 dpi and at least 1200 x 1800 pixels.

Please send submissions or questions to:

Kim Kezer at kkezer@zooneungland.com or
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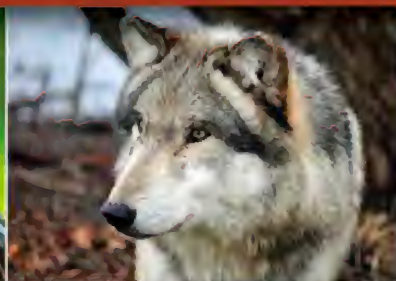
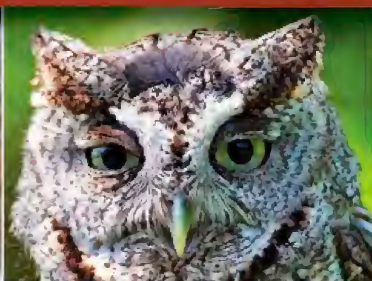
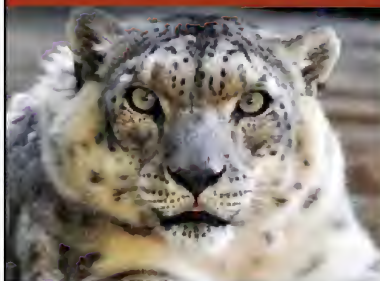
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